

ABSTRACT OF THE DISCLOSURE

Amorphous and polycrystalline III-V semiconductor including (Ga,As), (Al,As), (In,As), (Ga,N), and (Ga,P) materials were grown at low temperatures on semiconductor substrates. After growth, different substrates containing the low temperature grown material were pressed together in a pressure jig before being annealed. The annealing temperatures ranged from about 300°C to 800°C for annealing times between 30 minutes and 10 hours, depending on the bonding materials. The structures remained pressed together throughout the course of the annealing. Strong bonds were obtained for bonding layers between different substrates that were as thin as 3nm and as thick as 600nm. The bonds were ohmic with a relatively small resistance, optically transparent, and independent of the orientation of the underlying structures.